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## Case Report

# Giant Mature Cystic Teratoma in an Indian Pariah Bitch

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### ABSTRACT

**Introduction:** Ovarian teratomas are uncommon tumors in female dogs, characterized by the presence of tissues derived from embryonic layers. Although most ovarian teratomas are benign, histopathological evaluation is crucial for accurate clinical diagnosis and management. The present report presented a rare case of tridermal teratoma in an eight-year-old bitch and its successful surgical management.**Case report:** In the present case report, an eight-year-old Indian Pariah bitch weighing 16.7 kg was presented to the Teaching Veterinary Clinical Complex, India with anorexia and abdominal distension. Radiography and ultrasonography of the abdomen revealed two abnormal masses in the abdominal cavity. The bitch was operated for exploratory laparotomy, and the masses were removed. One mass weighed 4.2 kg and was 30×22×14 cm in size, while the other mass, which was attached to the left ovary, weighed 0.2 kg and was 7×5×4 cm in size. Grossly, both masses demonstrated encapsulation, lobulation, and severe congestion. The external surface of the masses had pigmentation. In contrast, the cut surface revealed cystic spaces filled with tufts of hair embedded in thick, creamy-white sebaceous material, along with fat and bone tissues. Histopathological examination confirmed both masses as benign mature cystic teratomas, comprising well-differentiated structures derived from all three germ layers.**Conclusion:** The abnormal masses of cystic teratomas in the abdominal cavity were diagnosed and successfully removed by surgery.

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## 1. Introduction

Teratomas are germ cell tumors characterized by the presence of tissues derived from two or three germ layers, such as ectoderm, mesoderm, and endoderm<sup>1</sup>. These tumors originate from pluripotent cells that are remnants of the embryonic notochord<sup>1</sup>. They can be immature and mature teratomas, depending on the degree of differentiation of tissues from each germ layer. Mature teratomas are usually benign and commonly found in domestic animals, whereas immature teratomas can be malignant and rare<sup>2-4</sup>. While teratomas comprise 20 percent of human ovarian tumors, the incidence in dogs and other domestic animals is significantly lower (1%)<sup>4-9</sup>. Ovarian teratomas are commonly found in

young animals, but the reported age ranges from 20 months to 13 years, with the mean age at diagnosis being 6.5 years<sup>3,10</sup>. The affected animal shows nonspecific clinical signs, which make the clinical diagnosis challenging. Histopathology of the tissue excised by exploratory laparotomy serves as the preferred modality of diagnosis. The present case reported a rare case of a giant mature cystic teratoma (teratoma adultum) in an Indian pariah bitch.

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## 2. Case report

The owner provided written informed consent for the animal's inclusion in this case report. An Indian Pariah bitch,

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8 years of age and weighing 16.7 kg, with a history of worsening abdominal distension, inappetence and mild lethargy was presented to the Teaching Veterinary Clinical Complex of DUVASU, Mathura, India. Clinical examination revealed a firm, non-painful, well-circumscribed mass in the abdominal cavity. Vital signs such as heart rate, respiratory rate, and rectal temperature were within normal limits. Hematological findings indicated mild anemia, with a packed cell volume of 29 percent, and leukocytosis ( $14500/\mu\text{L}$ ), suggestive of the chronic inflammatory process. Serum biochemistry revealed normal liver and kidney function.

On ultrasonography, a large, well-circumscribed heterogenous mass with hyperechoic and anechoic areas indicating mixed tissue density was observed in the abdominal cavity. Radiographs showed a large mass of soft tissue density with numerous irregular foci of calcification, raising suspicion of a teratoma. An exploratory laparotomy was performed under general anesthesia to excise the mass. An ovario-hysterectomy was also performed, and no evidence of recurrence or any disease associated with the tumor entity was noted during the year following the onset.

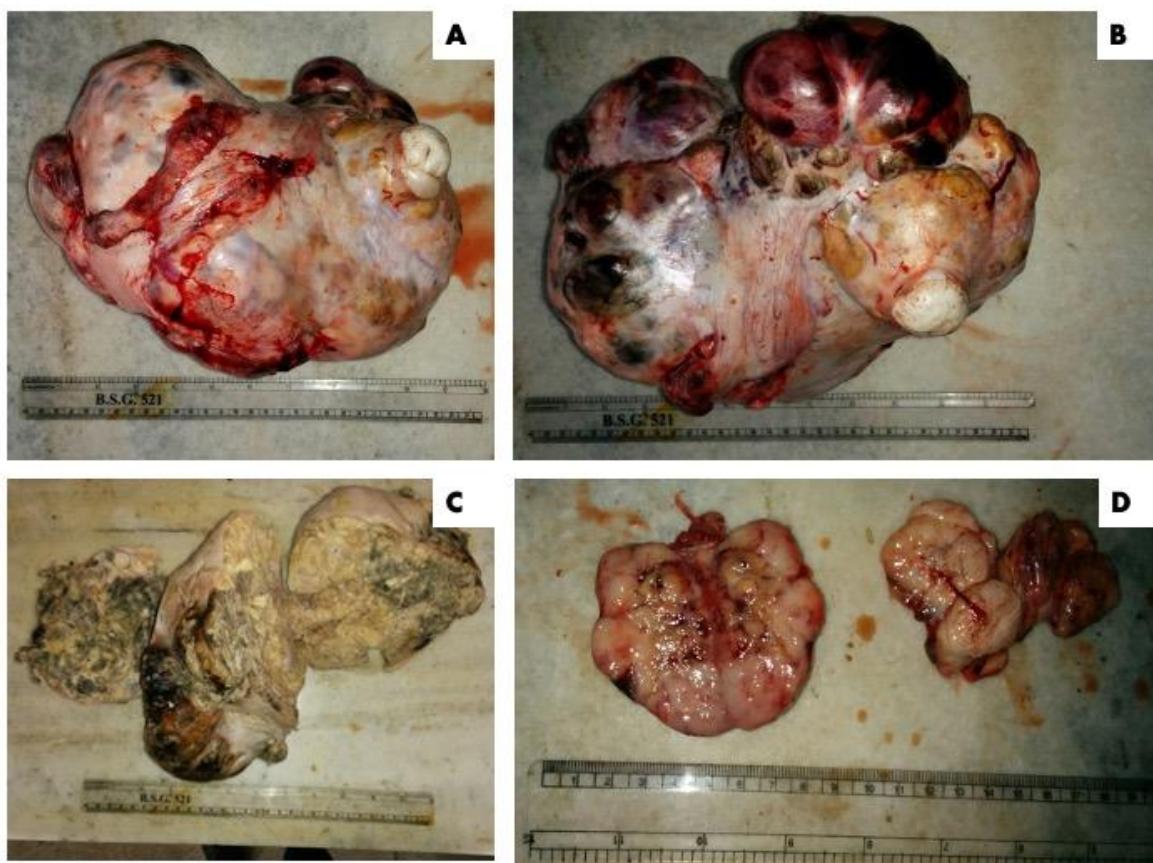
Two abnormal masses were surgically removed and sent to the Department of Veterinary Pathology, College of Veterinary Science and Animal Husbandry, DUVASU, Mathura, India. Both masses were cut, and representative tissues were fixed in 10% neutral buffered formalin for

routine histopathology.

The ultrasonographic appearance of heterogeneous echotexture and radiographic evidence of focal calcification are characteristic features that support the pre-surgical diagnosis<sup>11</sup>. However, definitive diagnosis was based on histopathological confirmation, as imaging alone cannot reliably differentiate teratomas from other mixed-tissue ovarian masses.

Surgical excision was decided, and complete laparoscopic excision was achieved with minimal perioperative complications, resulting in an excellent prognosis. An ovariohysterectomy was performed, and no signs of recurrence or tumor-associated disease were observed during the one-year follow-up period. The recurrence rate for benign ovarian teratomas is low, provided surgical margins are clear, as noted in similar cases reported by Sforza et al.<sup>5</sup> and Nagashima et al.<sup>12</sup>.

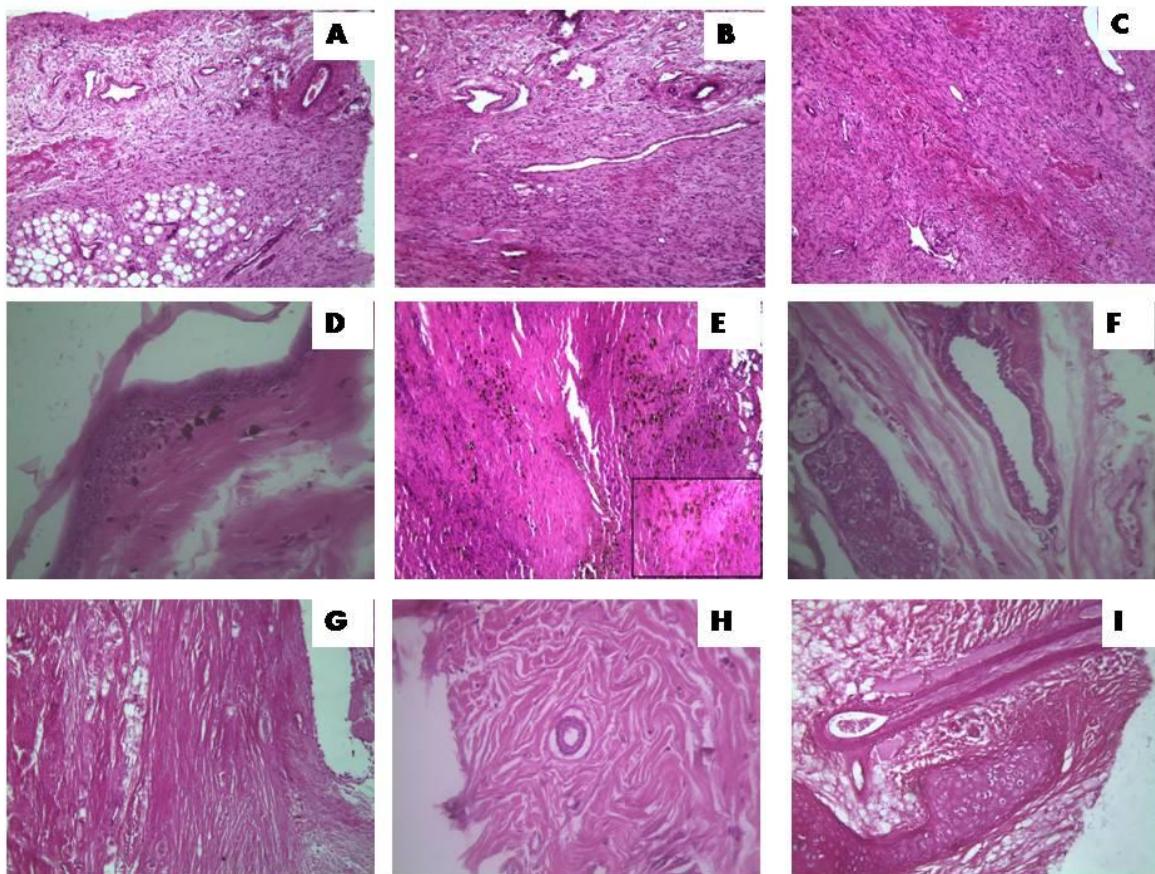
Grossly, an ovoid mass approximately  $30 \times 22 \times 14$  cm weighing 4.2 kg (Figure 1A) was found in the abdominal cavity, and another mass of 0.2 kg with dimensions  $7 \times 5 \times 4$  cm (Figure 1B) was found attached to the left ovary. Grossly, the tumor was encapsulated, lobulated, severely congested, and pigmented areas were visible on the superficial surface of the mass, while cystic cavities containing tufts of hair in thick, creamy-white, sebaceous fluid, fat, and bone were detected on the cut surface (Figure 1C and D).



**Figure 1.** Macroscopic observations of the teratoma in an 8-year-old Indian Pariah bitch. A: Dorsal surface of the tumorous mass weighing 4.2 kg, B: Ventral surface of the tumorous mass showing pockets of congestion and black discoloration, C: Cut surfaces of the retroperitoneal mass contained multiple cysts filled with hair matrix, creamy-white, sebaceous fluid, fat, caseous material, cartilaginous and bony spicules, D: Cut surfaces of the tumorous mass weighing 0.2kg was found attached to the left ovary.

Histopathologically, a mixture of tissues representing all three germ layers was observed in different sections of the ovarian mass. The tissues lacked organization; however, each type was identified and documented microscopically. Ectodermal components such as the epidermis and skin adnexa, including hair follicles (Figure 2I) and sebaceous and apocrine glands, were identified within the tumor mass (Figure 3G). Several cysts of varying sizes were observed, some containing keratinized layers and hair matrix within their lumens, while other tumor masses had linings composed entirely of keratin (Figure 2D). Cavernous spaces (Figure 2B) and localized areas of mononuclear inflammatory cell infiltration were noted in the dermis. Neural tissue with distinct neuropil structures, including neurons, spongy tissue, and glial

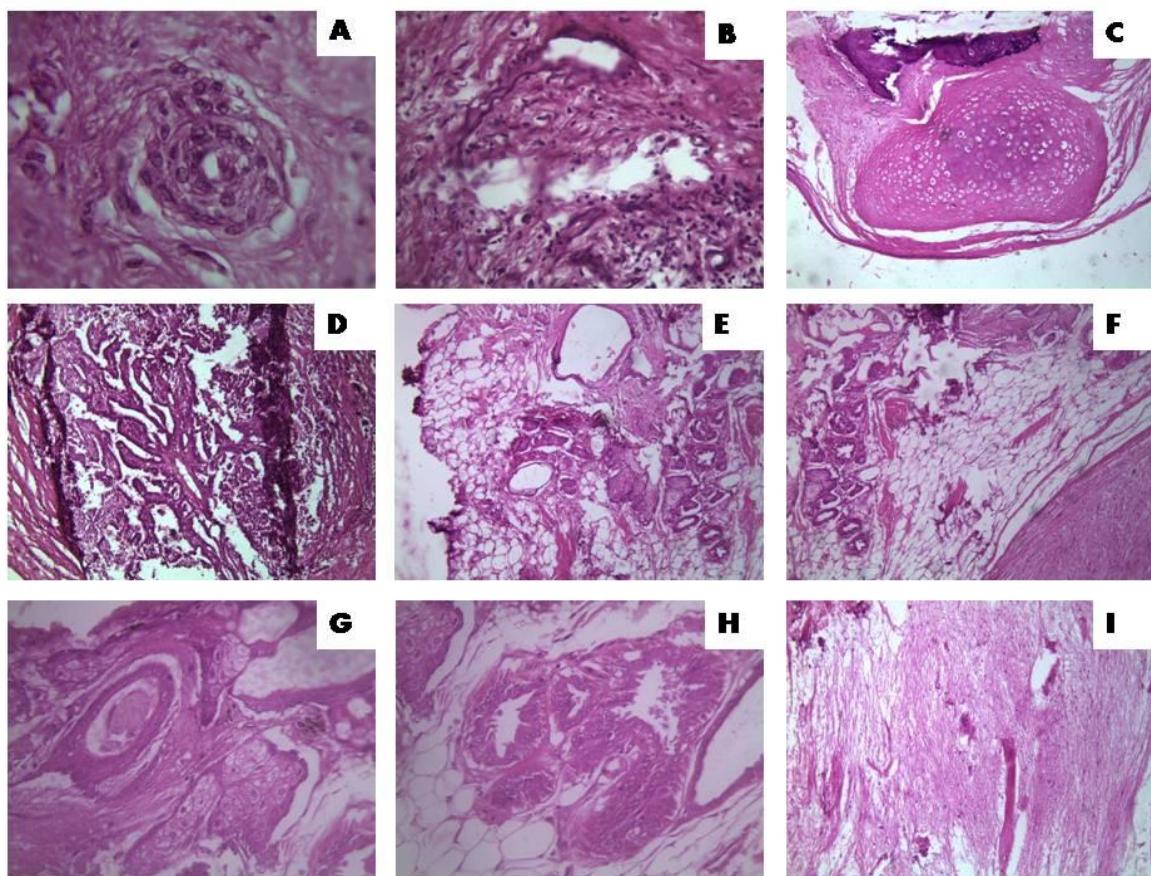
cells, was often found alongside the cutaneous elements (Figure 3I). Some areas of epidermal tissue contained numerous melanocytic cells (Figure 2D). Fibrous tissue was present, with several regions of fibrous connective tissue exhibiting increased melanin deposits (Figure 2E). A single layer of cuboidal epithelial cells, resembling ependymal cells and arranged in papillary projections, indicated choroid plexus tissue (Figure 3D). Noticeable collagen bundles separated the neural elements from areas with epidermal cells and dermal adnexa. Mesodermal components comprised clusters of cartilage, bone spicules, and adipose tissue (Figures 2A and 3C). Furthermore, ciliated respiratory epithelium and mucous glands were observed (Figure 2F). Structures resembling skeletal muscle were also present, with ducts lined by cuboidal epithelial cells (Figures 2G and H).



**Figure 2.** The ovarian mature teratoma in an 8-year-old Indian Pariah bitch. The teratoma contained well-differentiated tissues derived from all three germ layers, including ectoderm, mesoderm, and endoderm. A, B, and C: The diverse tissue components observed within the tumor, D and E: Fibroblastic tissue had cavernous structures, hair follicles, areas of congestion, and adipose tissue. Pigment epithelium containing melanin granules with keratinization and connective tissue containing melanin deposits (inset). F: Tubular structure with respiratory ciliated epithelium with adjoining secretory gland-like structures, G and H: Skeletal muscle-like structures with a cavernous structure, I: Hyaline cartilage and hair follicles are embedded in connective tissue. Hematoxylin and eosin (H&E) staining (100X).

The morphological and microscopic findings confirmed that the tumor masses were benign cystic mature teratoma. Teratoma arising from retroperitoneal tissue has not been reported in bitches but primary ovarian tumors are encountered in dogs with low prevalence. Cotchin<sup>13</sup> reported that ovarian tumors

accounted for only one percent of all neoplasms in a survey of 2300 dogs. Similarly, Sforna et al.<sup>5</sup> observed a comparable frequency, documenting ovarian tumors in 1.04% of 4770 canine tumor cases. In contrast to humans, where teratomas can often be malignant, these tumors are typically benign in animals<sup>14</sup>.



**Figure 3.** The ovarian teratoma in an 8-year-old Indian Pariah bitch. The teratoma contained tissues from three germ layers, including ectoderm, mesoderm, and endoderm. A: Endothelial cell (400X), B: Fibroblastic tissue (400X), C: Cartilage with bony spicules (100X), D: Nervous tissue showing differentiation of the choroid plexus (400X), E: Subcutaneous fat with skin adnexa containing secretory glandular structures (400X), F: Adipose tissue with a secretory gland-like structure surrounding Nervous tissue 400X, G: Hair follicle with skin adnexa (400X), H: Respiratory ciliated epithelium (400X), I: Nervous tissue has neuropil. (H&E) staining (100X).

#### 4. Discussion

Teratomas are common among canine germ cell ovarian tumors<sup>6-9</sup>. Twenty percent of all human ovarian tumors have been reported as ovarian teratomas, whereas the incidence was known to be merely one percent for domestic animals<sup>5,12,13</sup>. The prevalence of canine ovarian teratomas among all ovarian tumors ranges from 1.04% to 2.7%<sup>5,12</sup>. Teratomas are also commonly observed in the testis of both humans and animals. While testicular teratomas often exhibit malignant behavior, ovarian teratomas are typically benign, especially in canines<sup>2,7,12,15</sup>. In animals, testicular teratomas are more frequently reported in horses, whereas ovarian teratomas are predominantly found in dogs<sup>16-18</sup>.

Among teratomas, mesodermal and ectodermal tissues are identified in approximately 93% and 71% of cases, respectively, though ectodermal components are exceptionally rare<sup>19</sup>. The current case is unique because it features well-differentiated tissues derived from all three germ layers, including endoderm, mesoderm, and ectoderm, a rare finding according to existing literature. Mature teratomas have a low rate (~1%) of malignant

transformation in any of their components, while immature teratomas often contain at least one embryonic tissue type that is poorly differentiated. In particular, the presence of immature neural tissue or neuroepithelial elements indicates malignancy in immature teratomas<sup>20</sup>. Other poorly differentiated components, such as cartilaginous, osseous, muscular, or epidermal tissues, may also be observed<sup>19</sup>. As revealed by histomorphological analysis, the presence of well-differentiated tissues representing all three germ layers led to the diagnosis of a mature solid cystic teratoma.

In dogs, ovarian teratomas are usually mature (benign), solid cystic tumors, and most commonly affect the left ovary<sup>3,17</sup>. Consistent with this pattern, the tumor in the present case was also located in the left ovary. While such tumors are often reported in dogs over six years of age<sup>5,17</sup> the subject of this case was an eight-year-old Indian Pariah bitch. Surgical excision via laparotomy is the treatment of choice<sup>21</sup>, and performing an ovariohysterectomy concurrently is generally recommended<sup>3,17, 22</sup>. Similarly, an ovariohysterectomy was performed in the present case, and no evidence of recurrence or tumor-related disease was observed during the one-year postoperative follow-up.

## 5. Conclusion

The clinical presentation, diagnostic challenges, and successful surgical management of a giant mature cystic teratoma in an Indian Pariah bitch were highlighted in the present study. A multidisciplinary diagnostic approach, involving imaging and histopathology, proved essential for accurate diagnosis and appropriate treatment planning. Gross and microscopic findings, including well-defined cystic cavities filled with fat, hair tufts, and serosanguineous fluid, were consistent with descriptions of mature teratomas. Echoic areas in ultrasonography suggested a predominantly solid mass with focal calcifications, supporting the diagnosis of a benign teratoma. Histopathology confirmed the diagnosis by identifying mature tissues from all three germ layers. This report underscored the importance of considering teratomas in the differential diagnoses of abdominal masses in female dogs, particularly in resource-limited settings where other diagnostic techniques, such as IHC, were not possible due to a lack of funding and facilities. Timely surgical intervention, as demonstrated in the current case, can lead to a positive clinical outcome.

## Declarations

### *Availability of data and materials*

In the present case, the original images obtained during the study are available from the corresponding author (Rahul Kumar) on request.

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### *Competing interests*

The authors declared that there is no conflict of interest.

### *Authors' contributions*

Rahul Kumar performed the diagnostic pathology, writing and revising the draft article. Rudra Pratap Pandey performed the surgery on the patient and reviewed the article. All authors have read and approved the final version of the article.

### *Ethical considerations*

The article was written by authors based on the original data, and it was not submitted or published, in whole or in part, in any other publication. The text article is checked by a well-known plagiarism checker software before

submission to the journal. The patient in this case report was presented to the clinic for treatment, so approval from an ethics committee is not required for this case report.

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